GAS DYNAMIC INVESTIGATION OF A VALVELESS PULSE JET TUBE

BY

SHEE-MANG YEN

B.S., Chiao-Tung University, 1944
M.S., University of Illinois, 1948

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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A gas dynamic analysis was made of a pulse jet tube with a Borda Mouth as the valve element. The graphical treatment based upon the method of characteristics required a detailed study of the operation of the Borda Mouth. Information on the latter was drawn from theoretical considerations as well as experimental verifications using essentially the water analogy of two-dimensional flow of gas. The results had to be interpreted as a boundary condition for the one-dimensional treatment.

The simplified analysis using a constant volume combustion process indicates the possibility of static operation. The treatment based on an experimental pressure - time diagram checked with test results fairly well, and also gave more insight into the gas dynamic behavior of the flow inside the jet tube. The combustion process, as expected, was found to be the most decisive factor in the operation of the jet tube. The length ratio of the smaller intake tube and the main tube was found to have great influence. The influence of area ratio while important in the static case, appears to have less bearing on operation with ram effect.

VITA

Shee-Mang Yen was born on September 5, 1919, in Soochow, China. He received the degree of Bachelor of Science in Mechanical Engineering from Chiao-Tung University in June, 1944. He worked as a design engineer in Central Machine Works in Kunming, China for a period of one and one half years and then was transferred to Kiang Nan Power Administration for a period of another year.

He entered the University of Illinois for graduate study in the summer of 1947, and received the degree of Master of Science a year later. While continuing his work toward the doctorate at the University, he held a Research Assistantship from September, 1948, to September, 1949, in the Department of Aeronautical Engineering and a University Fellowship for the two academic years 1949-50, 1950-51.

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